

## **CLAIMS**

We claim:

1. A stent comprising:

5        a generally cylindrical stent body having proximal and distal opposing ends with a  
body wall having a surface extending therebetween;

an expandable filler material uniformly bonded to a thin sheet rolled upon itself  
having a circumference extending around a longitudinal stent axis; and

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a barrier film for encapsulating said stent.

2. A stent as in claim 1 wherein:

the stent is manufactured from stainless steel.

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3. A stent as in claim 1 wherein:

the stent is manufactured from Elgiloy.

4. A stent as in claim 1 wherein:

20        the expandable filler material is soluble.

5. A stent as in claim 1 wherein:

the expandable filler material is inert.

6. A stent as in claim 1 wherein:

the expandable filler material utilized is casein.

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7. A stent as in claim 1 wherein:

the barrier film is manufactured from polypropylene.

8. A stent as in claim 1 wherein:

10 the barrier film is manufactured from polytetraflouoroethylene.

9. A stent as in claim 1 wherein:

the barrier film is porous.

15 10. A stent as in claim 1 wherein:

the expandable filler material is pressure formed to the thin sheet.

11. A stent as in claim 1 wherein:

the stent is crimped onto a catheter.

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12. A stent as in claim 1 wherein:

a catheter is used for implantation.

13. A stent as in claim 1 wherein:

the barrier film is hermetically heat sealed.

14. A stent as in claim 1 wherein:

5       the stent, the expandable filler material, the thin sheet, and the barrier film are  
biocompatible.

15. A stent as in claim 1 wherein:

the stent, expandable filler material, thin sheet, and the barrier film are non-  
10       biodegradeable.

16. A stent as in claim 1 wherein:

a angioplasty balloon is used for implantation.

15       17. A stent as in claim 1 wherein:

a thromboresistant coating is applied to the barrier film.

18. A stent as in claim 1 wherein:

heparin is applied to the barrier film.

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19. A stent device as in claim 1 wherein:

the stent is used in conjunction with another stent.

20. A stent device as in claim 1 wherein:

    said stent is used on animals.

21. A stent device as in claim 1 wherein:

5      said stent is used on humans.

22. A stent device as in claim 1 wherein:

    the thin sheet is foil.

10 23. A stent device as in claim 1 wherein:

    the thin sheet is polymeric.

24. A method for bonding the expandable filler material to the thin sheet according to  
claim 1 comprising:

15      unrolling the thin sheet through an embossing roll;

    depositing the expandable filler material from a bulk feeder onto the thin sheet;

20      spreading with a doctor blade the expandable filler material uniformly on the thin  
sheet;

    pressure bonding the expandable filler material and the thin sheet with a calendar  
rolls.

25. A method for longitudinally rolling the expandable filler material and the thin sheet and insertion into the stent according to claim 1 comprising:

5 cutting the bonded thin sheet and expandable filler material to the length and circumference of the stent;

rolling longitudinally the bonded sheet and the expandable filler material; and

inserting the bonded sheet and the expandable filler material into the stent.

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26. A method for hermetically heat sealing the barrier film according to claim 11 comprising:

cutting the barrier film to the appropriate length;

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folding the barrier film around the stent;

welding ultrasonically a U-shaped seam into the barrier film;

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inserting the expandable filler material bonded to the thin sheet into the folded barrier film;

welding ultrasonically the barrier film and the expandable filler material bonded to the thin sheet on the U-shaped seam; and

folding the top of the U-shaped seam into the stent.

27. A detachable balloon comprising:

5           a balloon capable of assuming deflated and inflated states having at least  
one opening;

a crimp ring surrounding the outside circumference of the balloon  
opening;

10           a septum surrounding the inside circumference of the balloon opening  
covering the balloon opening; and

a rigid band surrounding the inside circumference of the septum.

15           28. A detachable balloon as in claim 27 wherein:  
said balloon is disposed in and secured to a generally cylindrical stent body  
having proximal and distal opposing ends with a body wall having a surface  
extending therebetween.

20           29. A detachable balloon as in claim 28 wherein:  
heparin is applied to the outside of the stent.

30. A detachable balloon as in claim 28 wherein:

a thromboresistant coating is applied to the outside of the stent.

31. A detachable balloon as in claim 27 wherein:

5 a plurality of attaching bands secure said balloon to said stent.

32. A detachable balloon as in claim 27 wherein:

an expandable filler material inflates said balloon.

10 33. A detachable balloon as in claim 27 wherein:

the expandable filler material is a solution of saline and expandable particles.

34. A detachable balloon as in claim 27 wherein:

the expandable filler material is polyvinyl alcohol.

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35. A detachable balloon as in claim 27 wherein:

the expandable filler material is gelatin foam.

36. A detachable balloon as in claim 27 wherein:

20 the expandable filler material is n-butyl-cyanoacrylate.

37. A detachable balloon as in claim 27 wherein:

the expandable filler material is a gas.

38. A detachable balloon as in claim 27 wherein:

a diaphragm and a convex core ring seals said balloon.

5 39. A detachable balloon device as in claim 38 wherein:

a syringe and a plunger is used for deflation.

40. A detachable balloon as in claim 38 wherein:

a syringe is used for deflation.

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41. A detachable balloon as in claim 27 wherein:

a catheter is used for implantation.

42. A detachable balloon as in claim 27 wherein:

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a syringe is used for inflation.

43. A detachable balloon as in claim 27 wherein:

a syringe is used for deflation.

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44. A detachable balloon as in claim 27 wherein:

a syringe and a plunger is used for inflation.

45. A detachable balloon as in claim 27 wherein:

heparin is applied to the outside of the balloon.

46. A detachable balloon as in claim 27 wherein:

a thromboresistant material is applied to the outside of the balloon.

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47. A detachable balloon as in claim 27 wherein:

the balloon is latex.

48. A detachable balloon as in claim 27 wherein:

10           the balloon is silicon.

49. A detachable balloon as in claim 27 wherein:

the balloon is polypropylene.

15       50. A detachable balloon as in claim 27 wherein:

the balloon is polytetraflouroethylene.

51. A detachable balloon as in claim 27 wherein:

the rigid band is stainless steel.

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52. A detachable balloon as in claim 27 wherein:

the rigid band is egiloy.

53. An internal ligation device comprising:

a housing;

a plurality of sharps each of said sharps having a pointed tip located at the  
5 proximal end and distal opposing end with a sleeve having a surface extending  
therebetween wherein the said proximal end is unattached wherein the distal end  
is placed inside of the housing;

10 a plurality of slides each of said slides having a proximal end and a distal end  
wherein the proximal end is unattached and wherein the distal end is placed inside  
of the sharps;

15 a plurality of cutting blades each of said cutting blades having a proximal end and  
a distal end wherein the proximal end is unattached and wherein the distal end is  
placed inside of the housing;

20 a plurality of sutures, each of said sutures having a proximal end and distal end  
wherein the proximal end is folded over said slide and wherein the distal end is  
placed inside of the housing.

54. An internal ligation device as in claim 53 wherein:

a clamping mechanism is located above said sutures.

55. An internal ligation device as in claim 53 wherein:

a means for cauterization is used to sever the excess of the sutures.

56. An internal ligation device as in claim 53 wherein:

5 a plurality of plungers are used to control the internal ligation device.

57. An internal ligation device as in claim 53 wherein:

the sharps are stainless steel.

10 58. An internal ligation device as in claim 53 wherein:

the cutting blades are stainless steel.

59. An internal ligation device as in claim 53 wherein:

the housing is stainless steel.

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60. An internal ligation device as in claim 53 wherein:

the clamping mechanism is polypropylene.

61. An internal ligation device as in claim 53 wherein:

20 the sharp sleeves are polypropylene.

62. An internal ligation device as in claim 53 wherein:

the slides are polypropylene.

63. An internal ligation device as in claim 53 wherein:  
the sharp sleeves are preformed in a curved shape.

5 64. An internal ligation device as in claim 53 wherein:  
the sutures are monofilament.

65. An internal ligation device as in claim 53 wherein:  
the sutures are braided.

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66. An internal ligation device as in claim 53 wherein:  
a catheter is used for implantation.

67. An internal ligation device as in claim 53 wherein:  
15 there are 3 slides.

68. An internal ligation device as in claim 53 wherein:  
there are 3 sharps.

20 69. An internal ligation device as in claim 53 wherein:  
there are 3 sutures.

70. An internal ligation device as in claim 53 wherein:

there are 3 cutting blades.

71. A method for ligating a vessel comprising the steps of:

5 placing an internal ligation device within a vessel by percutaneous catheteral

procedure;

advancing a plurality of sharp sleeves;

advancing a plurality of slides;

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piercing the vessel wall with a plurality of sharps;

advancing the slides;

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expanding a plurality of preformed sutures outside of the vessel wall;

retracting the slides to suture release surfaces;

shedding the sutures;

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retracting the slides and the sharp sleeves inside the internal ligation device; and

tightening the sutures.

72. The method of claim 71 further comprising:

advancing the cutting blades wherein the sutures are severed on the top surface of the clamps.

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73. The method of claim 71 further comprising:

cauterizing the sutures wherein the sutures are severed on the top surface of the clamps.

10 74. The method of claim 71 further comprising:

cauterizing the sutures bonding them together.

75. The method of claim 71 wherein:

plungers are used in order to control the internal ligation device.

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